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FURTHER OBSERVATIONS ON THE EASTERN ACAULESCENT VIOLETS.[1]

CHARLES LOUIS POLLARD.

IN a paper published two years ago in the *Proceedings* of the Biological Society of Washington,[2] I presented a tentative revision of the purple-flowered, stemless violets found in the northeastern United States. Since that time I have been engaged in field study of the genus in New Jersey, Pennsylvania, the District of Columbia, and Virginia, a territory from which the larger proportion of early types was obtained. The excellent library of Professor E. L. Greene, of the Catholic University, has been kindly placed at my disposal, and the opportunity thus afforded of studying the unpublished colored drawings of Le Conte, illustrative of the latter's well-known monograph of the genus, has been of great value in clearing up doubtful determinations. The herbarium of the Philadelphia Academy of Sciences, containing specimens ticketed by Nuttall, Schweinitz, and Darlington, has also afforded material assistance. Many friends and correspondents, to whom I am deeply indebted, have aided me with living and dried plants.

In the paper above referred to nine species and one variety were enumerated among the purple-flowered, acaulescent class. As a result of subsequent study this number must be increased at least twofold, and Professor Greene's investigations have shown that the violets of Canada and the Great Lake region are as yet but imperfectly understood. Mr. Macoun's observations during the past season, communicated to Professor Greene, have enriched the genus by five species, all natives of Canada; and I doubt not that similar results would follow an exploration of the southern portions of British Columbia.

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[1] Published by permission of the Secretary of the Smithsonian Institution.

[2] **10**: 85–92. 1896.

Before discussing certain species in detail it may be well to outline briefly the characters upon which we must depend for any thorough understanding of this genus. At the outset I wish to emphasize the importance of unremitting field work, and the absolute uselessness of herbarium material unless one is fortified by previous familiarity with the growing plant. It should not be forgotten that the value of a herbarium for purposes of systematic research lies in the advantage thereby gained of having material convenient for morphological and histological study, and not in that it provides in any sense a proper substitute for the living individuals. Habit as well as habitat, the texture of the herbage, color of the flowers, position of the cleistogenes, nervation, shape and degrees of pubescence of the leaves, nature of the surrounding vegetation; all these will be taken into consideration by the careful ionologist, and they are each best derived from outdoor investigation. Moreover we should not be content with superficial glances at occasional plants. A large number of individuals should be observed, and every feature of their environment noted; then it will be impossible for any discriminating botanist to make a comment such as I recently heard, that *Viola ovata* is "nothing but a hairy *sagittata* with ovate leaves, growing in dry ground."

In recognizing the variability of leaf-outline often presented by a single individual, there is a tendency to misapprehend or to overlook the fact that in all of the heterophyllous violets the earliest leaves are practically uniform and similar in all the species, and as they are immediately succeeded by others of a totally different type, should never be taken into account in critical diagnoses. Thus the first leaf of *V. sagittata* is cordate-reniform, obtuse and crenate, exactly like the corresponding organ of *V. palmata;* yet in the one case the characteristic foliage has lanceolate, sagittate and glabrous blades, and in the other broadly cordate, pubescent and more or less lobed blades. I am not aware that anyone has ever proposed to unite these two species on account of the similarity of their primitive leaves, and yet my attention has frequently been called to these example of early vernal foliage as an illustration of so-called "intergrading characters." Indeed in a recent important volume dealing with systematic botany in this country the statement is made in a footnote that "the contour of the leaf, varying upon the same individual from reniform to ovate and acute, affords no satisfactory distinction." Such a remarkable variation can scarcely be manifest to the ordinary observer unless the characterless primitive foliage is taken into consideration. With equal consistency and discrimination we might attempt to compare the various species of Ipomoea upon the basis of their remarkably uniform bilobed cotyledons. In two or three of our eastern violets leaf-contour, with respect to the mature foliage, plays an important part in differentiating the species. If it were not for the trigonous outline of the leaf of *V. emarginata*, for example, that species might by those unfamiliar with the habits of violets be confused with *V. sagittata;* but the elongated lanceolate blade of the latter cannot fail to render it distinct to any observer.

In the subjoined key I have followed the primary division of Dr. Gray and other authorities, separating *V. pedata* as a distinct class on account of the characters found in the rootstock and stigma. The remaining divisions are somewhat arbitrary, as I fully realize the futility of constructing any key in the hope that it will afford conclusive determinations of every unusual form. To the larger divisions have been given group names, partly for the sake of convenience, and partly in order to make clear the affinities of each species. A knowledge of these primary groups is often indispensable in determining a violet of doubtful relationship. The key includes all the acaulescent species east of the Mississippi now known to me, with the exception of the Canadian forms recently described by Professor Greene.[3] In the notes following the key are mentioned only those species deserving special comment.

SECTION I.

Leaves and flowering scapes directly from a short, erect caudex; plants not stoloniferous; cleistogamous apetalous flowers apparently wanting; petals beardless, blue; stigma large, not rostrate.

CLASS 1. **Pedatæ.** 1. *V. pedata*

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[3] Pitt. 3 : 333 *et seq.*

SECTION II.

Leaves and scapes from a horizontal or ascending, often multicipital rootstock; plants not stoloniferous (except in CLASS 5), but bearing numerous cleistogamous apetalous flowers; petals more or less bearded, purple; stigma small, rostrate.

CLASS 2. **Heterophyllæ.** Leaves on the same individual entire or variously lobed, from cordate-ovate to reniform in general outline; scapes of the cleistogamous flowers deflexed or ascending, not erect (except in *V. Brittoniana*).

- Plants always more or less pubescent 4. *V. palmata* and *vars.*
- Plants comparatively glabrous, or at most with pubescent petiole.
  - Western campestrine species.
    - Leaves divided almost to base with narrowly linear lobes 2. *V. pedatifida*
    - Leaves parted scarcely to the middle with rather broad lobes 3. *V. Bernardi*
  - Eastern coastal plain species.
    - Southern; leaves very irregularly lobed and incised.
      - Plant succulent 7. *V. esculenta*
      - Plant not succulent 8. *V. insignis*
    - Northern; leaves symmetrically lobed.
      - Leaves large, pedately 5–7-parted to base 6. *V. septemloba*
      - Leaves with a large median lobe and pinnately arranged lateral lobes 5. *V. Brittoniana*

CLASS 3. **Communes.** Leaves on the same individual similar or nearly so, rarely pubescent (except in *villosa*), in general outline cordate-ovate; scapes of the cleistogamous flowers either erect or deflexed.

- Woodland species;[4] peduncles of the cleistogenes deflexed.
  - Plants small (less than 1^{dm} high).
    - Leaves reniform-orbicular, silvery-hirsute above 15. *V. villosa*
    - Leaves deltoid-triangular, apparently glabrous above 16. *V. Langloisii*
  - Plants large (more than 1^{dm} high).
    - Leaves broadly asariform; cleistogenes hypogaeous in fruit 10. *V. domestica*
    - Leaves usually broadly cordate; cleistogenes not hypogaeous.
      - Keel-petal cuspidate; leaves hirsutulous 11. *V. cuspidata*
      - Keel-petal not cuspidate; leaves glabrate 9. *V. communis*
- Bog-meadow species; peduncles of the cleistogenes strictly erect.
  - Leaves markedly cucullate 13. *V. cucullata*

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[4] By this expression is meant all dry or merely moist shaded localities as distinguished from open, sunny bog-meadows and partially shaded water courses. The position of the cleistogenes in nos. 11, 14, and 16 is uncertain.

Leaves scarcely at all cucullate.
Leaves yellowish-green, prominently veined, obtuse 14. *V. affinis*
Leaves bright green, not prominently veined, acute 12. *V. obliqua*

CLASS 4. **Sagittatæ.** Leaves all similar, ovate-sagittate or ovate-lanceolate in general outline; entire or slightly lobed; peduncles of the cleistogamous flowers strictly erect; flowers dark purple.

Plants distinctly villous-hirsute.
Spur of the corolla saccate-dilated; leaves with a deep sinus 21. *V. Carolina*
Spur of the corolla not conspicuous; leaves with a shallow sinus or none 20. *V. ovata*
Plants glabrate or only ciliate.
Leaves elongated-oval, of nearly similar diameter throughout; basal lobes conspicuous 17. *V. sagittata*
Leaves ovate-triangular, nearly equilateral, the base truncate, not often lobed; petals emarginate 18. *V. emarginata*
Leaves elongated-ovate, tapering to apex, slightly dentate at base 19. *V. dentata*

CLASS 5. **Odoratæ.** Plants stoloniferous; leaves reniform-cordate; flowers purple.

Rootstock thickened, scaly; plant introduced 22. *V. odorata*
Rootstock filiform; species native, far northern.
Leaves hirsute-pubescent, crenate 23. *V. Selkirkii*
Leaves glabrous, crenulate 24. *V. palustris*

SECTION III.

Leaves variable in outline; plants mostly stoloniferous from filiform rootstocks; spur short and saccate; stigma short, pointed; petals yellow or white, usually veined with purple; position of the cleistogenes various.

CLASS 6. **Blandæ.** Corolla white.

Leaves from ovate to orbicular; cleistogenes deflexed.
Leaves reniform, pubescent 29. *V. renifolia*
Leaves cordate-ovate, glabrate.
Petioles red-spotted; leaves pale beneath 30. *V. amoena*
Petioles not red-spotted; leaves green beneath 28. *V. blanda*
Leaves from ovate-lanceolate to narrowly linear; cleistogenes erect.
Leaves linear or linear-lanceolate.
Blade and petiole coalescent 25. *V. vittata*
Blade and petiole distinct, of nearly equal length 26. *V. lanceolata*
Leaves ovate-lanceolate, the blade decurrent 27. *V. primulaefolia*

CLASS 7. **Orbiculares.** Corolla yellow ; cleistogenes deflexed
31. *V. rotundifolia*

VIOLA PEDATA L. Sp. Pl. 933. 1753.

V. digitata Pursh, Fl. Am. Sept. **1**: 171. 1812.
V. pedata bicolor Bursh, *fide* Raf. in DC. Prodr. **1**: 291. 1824.
V. pedata inornata Greene, Pitt. 3: 35. 1896.

This, the common bird's-foot violet, appears, as is well known, in two forms, in one of which the petals are pale blue and concolorous, in the other the uppermost petals deep velvety-purple. It is the latter form, so long known as the variety *bicolor*, which is figured by Plukenet, and on which Linnaeus based his type. Between these two extremes one finds in Maryland and Virginia every possible variation. Professor Greene considered the *pedata* of New England, which is usually the concolorous form, distinct from this variable southern plant, and bestowed on it the varietal name *inornata*. I have not been able to find characters upon which to base such a separation.

VIOLA BERNARDI Greene, Pitt. **3**: 260. 1898. As synonym.

V. pedatifida var. *Bernardi* Greene, l. c.

Professor Greene applies this name to a violet very familiar to me from a specimen in my own herbarium, collected in Wisconsin by Professor S. M. Tracy some years ago, which has since passed into the possession of the National Herbarium. The plant was so remarkable that Dr. Britton originally considered it distinct, and gave it a manuscript name. In the states of Michigan, Wisconsin, and northern Illinois it seems to be the prevailing form, and apparently entirely replaces *V. palmata*. Recently specimens have come to me from Chicago collected by Dr. Moffatt, which in addition to Dr. Greene's material show the plant to be a species intermediate between the PEDATÆ and the HETEROPHYLLÆ, having the foliage and aspect of the former, together with the rootstock and variable leaf-contour of the latter. I have been unable to discover cleistogamous flowers upon the material thus far examined.

VIOLA PALMATA L. Sp. Pl. 933, 1753.

V. palmata var. α *vulgaris* Ell. Bot. S. C. & Ga. **1**: 300. 1817.
V. palmata var. β *fragrans* Ell., l. c.
V. cucullata var. *palmata* A. Gray, Man. 78. 1867. [Ed. 5.]

Concerning this species there is a substantial agreement among the early authorities. Mr. Edmund G. Baker in a recent issue of the British *Journal of Botany* discusses the Linnæan type, which was based upon a poorly drawn figure of Plukenet; this might indeed stand for any of the HETEROPHYLLÆ, but Mr. Baker points out that both of Plukenet's specimens are pubescent and adds that the figure in Britton and Brown's *Flora* fairly matches the types, although these have leaves slightly less lobed. The true *palmata*, then, is a plant of rich woodlands, usually distinctly pubescent, with rather dark purple flowers, and leaves exhibiting a great diversity of lobation. I recognize in addition two well-known varieties, both of which are referable to older author ities, and abundantly represented in most herbaria.

VIOLA PALMATA DILATATA Ell., l. c.

V. triloba Schwein., Am. Journ. Sci. **5**: 57. 1822.
V. congener Le Conte, Ann. N. Y. Lyc. **2**: 140. 1828.

The leaves in this variety are uniformly three-lobed, though occasionally some of them will be found nearly entire, as often happens in the type. The lobes vary in shape, and are frequently dentate or incised, but the central one is constantly the largest. In the District of Columbia this is the prevailing form; indeed the range of *palmata* and its varieties is so strongly marked as almost to warrant a separation of *dilatata* and the type as two distinct species. *V. palmata* in its typical form I have not seen south of Harpers Ferry, except in the Blue Ridge mountains. In the lowlands it seems to be entirely replaced by *dilatata*. Schweinitz argues very strongly in favor of the specific identity of *V. triloba*, as he called it, and in all probability he had observed the difference in range between the two. The character of Elliott's description, and the habitat cited for his plant, leave little doubt as to its identity.

VIOLA PALMATA SORORIA (Willd).

V. sororia Willd. Enum. 263. 1809.
V. asarifolia Pursh, Fl. Am. Sept. Suppl. 732. 1814.
V. villosa var. β *cordifolia* Nutt. Gen. 148. 1818.

Dr. Britton has recognized this species in the *Illustrated Flora* and is still inclined to maintain it, but I fail to perceive in *sororia*, if the name be correctly applied, which is somewhat doubtful, anything more than an entire-leaved state of *V. palmata.* This variety seems remarkably distinct in its early vernal stage, but I have seen individuals put forth occasional lobed leaves, and it is not uncommon for specimens of *palmata* in cultivation to develop large, asariform, unlobed leaves late in the season, and in this condition they are absolutely undistinguishable from typical *sororia.* Among the early writers Pursh and Schweinitz were the only two that retained *sororia* in specific rank. Nuttall named it as a variety of *villosa*, which it somewhat suggests in habit.

Viola Brittoniana, nom. nov.

V. Atlantica Britton, Bull. Torr. Club **24**:92. 1897; not *V. Atlantica* Pomel, Nouv. Mat. Fl. Atlant. 215. 1874.

The specific designation originally assigned to this plant being clearly a homonym under all accepted rules, it is with great pleasure that I have associated Dr. Britton's name with it, the type coming from a region in which he has long lived and worked. It is essentially a maritime species, ranging practically the entire length of the Atlantic seaboard. Although I have not seen specimens from the Atlantic coast below Virginia Beach, it certainly occurs on the Gulf coast near Mobile, and probably at intermediate stations. It is a succulent, glabrous plant, exhibiting a fondness for saline soils. I have often had misgiving as to whether it might not, after all, be the true *septemloba* of Le Conte; but that is both described and figured as having flowers nearly two inches in diameter, and the cut of the leaves is also different. The plant is thriving in cultivation at the New York Botanical Garden, and when examined during the latter part of the past summer was found to possess erect cleistogenes. This furnishes us with a connecting link between the two groups of SAGITTATÆ and HETEROPHYLLÆ. Dr. Robinson has recently kindly communicated to me specimens of a violet discovered near Boston by Mr. H. A. Purdie which I consider undoubtedly referable to this species, although there is astonishing diversity in the lobation of the leaves.

VIOLA SEPTEMLOBA Le Conte, Ann. N. Y. Lyc. **2**: 141. 1828.

I have applied this name, although with some hesitation, to a rather local violet which at once attracts attention on account of its ample, flabelliform, and deeply divided leaves, which attain in late summer an enormous development. Le Conte remarks on the great length of the peduncles and the large size of the flower, features which I have noticed in the plants obtained about Washington. He assigns it to "Carolina and Georgia, in pine barrens only," and this habitat again agrees with my observations. Finally there is a plant in the herbarium of the Philadelphia Academy of Sciences, labeled, I believe, in Darlington's handwriting "*V. septemloba.*"

VIOLA ESCULENTA Ell., l. c., as synonym.

V. heterophylla Muhl. Cat. 25. 1813; not Poiret nor Bertol.
V. palmata var. δ *heterophylla* Ell., l. c.

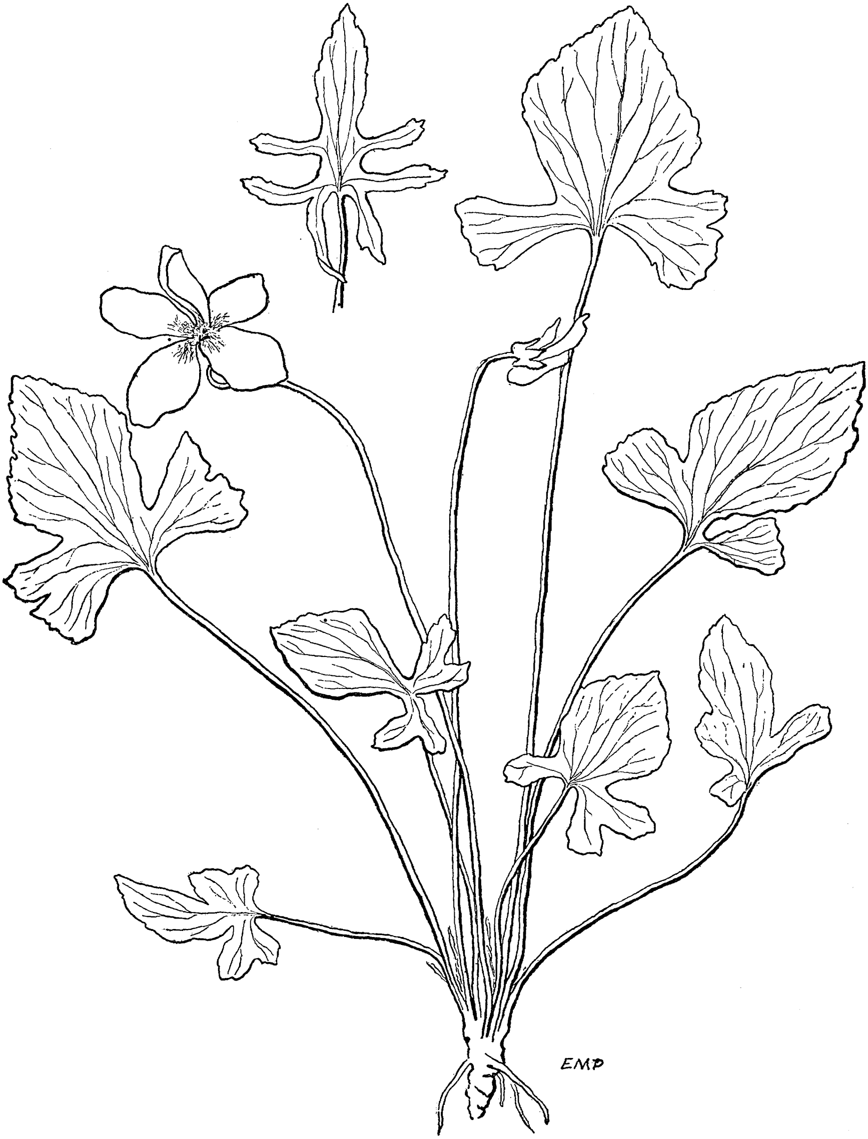
I have not seen Elliott's type of this species, and am dependent upon a colored drawing of Le Conte's, and a specimen from Louisiana which Professor Greene has seen in the herbarium of Dr. Mohr. The leaves are wonderfully diversified in outline and lobation after the manner of the following species, but it is stated by Elliott that the whole plant is extremely succulent, and is used by the negroes as a pot-herb. In the National Herbarium is a specimen from Elmira, New York, which would seem to match these characters, but I should hesitate to call it *V. esculenta* without having seen individuals from intermediate stations. The habitat of this violet is given as swamps, and in this preference it is distinct from all other members of the HETEROPHYLLÆ

Viola insignis, n. sp.

Acaulescent, glabrous, 2–5^{dm} high: stipules linear-acuminate, slightly ciliate; leaves long-petioled, the early ones cordate-ovate, the later broadly trigonous, with truncate base and very obtuse apex, variously 3–5 lobed, the central lobe largest; margins obscurely crenate, denticulate or nearly entire; venation distinctly palmate: flowering peduncle usually bibracteate, not surpassing the foliage: flower very large (4^{cm} in diameter), deep purple, the petals oblong, and of nearly equal size; lateral petals conspicuously bearded with glistening white hairs; spur short; sepals narrowly lanceolate and acuminate: capsule and apetalous flowers not observed.

Dry pine barrens, northern Florida. Types in U. S. National Herbarium, Curtiss no. 4518a, Jacksonville; A. Fredholm no. 425, Duval county. I would also refer here Nash's specimen from Eustis, no. 203, the leaves of which exhibit a form of lobation akin to that in *Brittoniana*, a pinnate arrangement of small lateral lobes on either side of a large central one; in this case, however, the two posterior lateral lobes are decidedly runcinate, as shown in the detached leaf shown in the accompanying figure. The species is the sole representative of the HETEROPHYLLÆ in Florida, so far as I have observed; and although from the illustration it may appear to resemble *palmata* it is most conspicuously distinct from that species.

Apparently all the members of the HETEROPHYLLÆ (with the exception of *V. Brittoniana*) produce their cleistogamous apetalous flowers on horizontal, or at most ascending, peduncles. The tendency of the ripening capsule is to seek the surface of the ground where it sooner or later becomes partially buried. In the matter of pubescence the species are divided, *palmata* exhibiting nearly constant pubescence, while the remaining species are glabrous or only sparsely hairy. The term glabrous must be used in a comparative sense where violets are concerned, since there is rarely a case in which traces of pubescence or ciliation cannot be found. With respect to leaf-variation it will also be noted that the primitive leaves in nearly every species are alike, and differ widely from the mature foliage.



VIOLA INSIGNIS, *n. sp.*

In the species of the next class, the COMMUNES, lobed leaves are rare exceptions. The position of the cleistogamous flowering peduncles is horizontal in the woodland species, and strictly erect in those growing in bogs or swamps. The physiological reasons for this are not clearly understood; but it is hoped that a series of experiments to be undertaken next season may shed light on the matter.

Viola communis, nom. nov.

V. obliqua and *V. cucullata* of recent authors; not of Hill nor of Aiton.

This, the commonest of our eastern violets, is separable from the below-mentioned segregates by the following combination of characters: Plant very stout, at flowering time low, but in late summer attaining a height of from eight to twelve inches; herbage bright dark green: leaves quite glabrous, cordate to reniform, more or less cucullate, very regularly crenate and distinctly obtuse at apex; nervation pinnate, with several additional primary nerves from base; stipules broad and foliaceous, laciniate: flowers deep purple, borne on peduncles almost invariably shorter than the petioles; cleistogamous flowers on horizontal peduncles, the oblong, scarcely angled capsules ripening on or beneath the surface of the ground.—Inhabits various situations, but prefers rich, moist soil in open places. I have emphasized these well-known characters in order that they may be borne in mind in comparison with the species discussed below, and I shall attempt to show that neither the *cucullata* of Aiton nor the *obliqua* of Hill can be regarded as identical with this plant unless we follow the lead of conservative botanists and continue to treat the species as an aggregate.

VIOLA DOMESTICA Bicknell, Britton and Brown, Illust. Fl. **3**: 519. 1898.

This peculiar violet has frequently been the subject of discussion between Dr. Britton, Mr. Bicknell and myself. I had concluded to publish it as a variety when I heard that Mr. Bicknell's specific description was already in type; and it very probably is better regarded as a species, although the strange habitat, which is invariably rich, cultivated ground in the close vicinity of dwellings, suggests that it originated as a cultivated variety. The range should have included the District of Columbia, for it is not uncommon here in congenial situations. Mr. Bicknell did not call attention to a very conspicuous peculiarity of the cleistogenes, namely, the tendency to bury themselves deep in the ground instead of remaining close to the surface. The leaves attain enormous proportions, frequently attaining a breadth of eight inches.

VIOLA CUSPIDATA Greene, Pitt. **3**: 314. 1898.

I have seen only young flowering specimens of this plant in cultivation at the Catholic University. Professor Greene considers it allied to *palmata*, but aside from the pubescence, the characters are those of the COMMUNES. It is a native of the Lake region and of Canada.

VIOLA OBLIQUA Hill, Hort. Kew. 316. *pl. 12.* 1769. Not of Aiton nor of Pursh.

In assigning Hill's name and figure to a certain slender plant of wet rills and shaded rocks, with glabrous foliage, narrowly ovate, cordate and acute leaves, I believe we can be certain both of matching the type and finding ourselves in general agreement with the botanists of the early part of this century. It is fully as likely that this little plant may have been discovered by some collector and sent to Kew as the hedgerow species which I have called *communis*, especially since the latter does not properly agree with Hill's figure.

VIOLA CUCULLATA Ait., Hort. Kew. **3**:288. 1789.

Professor Greene was the first to separate this species from the *communis-obliqua* aggregate, and additional observations have amply justified his conclusions. Dr. Britton has included the plant in the appendix to the *Illustrated Flora*, and there seems no doubt that it is the original *cucullata.* It is remarkable for the very pale blue flowers and light green foliage, which does not thrive in late summer like that of other members of the COMMUNES, but often collapses so that it is difficult to secure specimens showing the erect cleistogenes. The leaves are broader than long, with margins only slightly crenate or denticulate, the apex obtuse, and all or most of them cucullate. In *obliqua*, on the other hand, they are rather longer than broad, with sinuate-crenate margins and scarcely at all cucullate. Both species grow in moist soil, and both produce erect cleistogenes, very different, it will be observed, from *V. communis.* I think I have now shown the specific differences existing between the latter and its allies. There remain only two other names which could be possibly taken up for *communis;* one of these is *V. papilionacea* of Pursh, which I have seen figured by Le Conte, and which is totally different from any violet now known to us; the other is *V. affinis* Le Conte, discussed below.

VIOLA AFFINIS Le Conte, l. c. p. 138.

In an issue of *Pittonia*[5] which has just come to hand. Professor Greene makes the following statement concerning *V. affinis:* "This fine species, common enough in most woodlands of the District of Columbia and adjacent Maryland, was identified by me to my own satisfaction by Le Conte's excellent description, nearly two years since." Inasmuch as the description referred to is exceedingly brief and the characterization of the foliage as "foliis ovatis subacuminatis, crenato-dentatis" might be applied with equal propriety to many other violets, it is difficult to understand the grounds for Professor Greene's preemption of the name *affinis* for a species "common in most woodlands of the District of Columbia." It has always seemed to me that Le Conte himself places a very effectual obstacle in the way of our understanding when he observes at the close of his description "Nimis praecedenti affinis; nullos characteres distinctivos praeter pedunculi brevitatem et latiora calycis sepala invenire

[5] 3:337.

possum." In the light of this declaration I had always considered *V. affinis* a synonym of *V. cucullata*, the "preceding species" referred to by Le Conte. Nevertheless, having since examined the latter's colored drawing of *V. affinis*, I am inclined to agree with Professor Greene that the species is a distinct one, but I would refer to it a plant which to the best of my knowledge does not grow in the District of Columbia, but is of northward distribution. It is an inhabitant of shaded wet rocks, and has pale bluish-purple flowers ("basi albidis" as Le Conte says), and yellowish-green leaves shaped more like those of *ovata* ("foliis ovatis cordatis") than like those of most violets belonging to the COMMUNES.

VIOLA VILLOSA Walt. Fl. Car. 219. 1788.

V. cucullata var. *cordata* Gray, Man. 78. 1867. [Ed. 5.]
V. palmata var. *villosa* Robinson in Gray, Syn. Fl. N. Am. 1: 196. 1895.

In spite of the undivided foliage of this plant it suggests the HETEROPHYLLÆ more than the COMMUNES. Happily there is no difference of opinion of the applicability of the name, although the latter is not well chosen as the leaves are hirsute rather than villous. The flowers show more of a reddish tinge than those of any other violet with which I am familiar.

VIOLA SAGITTATA Ait. Hort. Kew. 3: 287. 1789.

This species was thoroughly well known and understood until it was made a general receptacle for other species of the same group. It was never characterized as "polymorphous" by either Elliott, Schweinitz or Le Conte, although in recent years it has been a stumbling block for many a student of the Violaceæ. As a matter of fact there is no violet more constant or unvarying either in foliage or habitat. It may be recognized by the very dark purple flowers, distinctly sagittate, narrowly oval, usually glabrous leaves, the petioles of which always exceed the flowering scapes. It chooses wet, springy spots along brooks as its favorite location, although it is frequently found in moist meadows.

VIOLA SAGITTATA SUBSAGITTATA (Greene).

V. subsagittata Greene, Pitt. **3**:316–317. 1898

Professor Greene thus explains his description: "I here propose, for a new subspecies, what is known throughout a great extent of country west of Lake Michigan, as *V. sagittata*." He further states that the differences consist in the marked pubescence, the larger flowers, and the smaller dimensions of the plant. I infer from his characterization of it as a subspecies that Dr. Greene would agree with my disposal of it as a geographical variety.

VIOLA EMARGINATA (Nutt.) Le Conte, l. c. p. 142, excl. char.

V. sagittata var. *β emarginata* Nutt. Gen. 148. 1818.

It is unnecessary to add anything to the very elaborate description of this plant published, with figures, in Pittonia **3**: 255, especially as Dr. Britton has also admitted the species in the Appendix to the third volume of the *Illustrated Flora*. It should be observed that although Le Conte raised Nuttall's variety to specific rank, and hence must be quoted as authority for the name, the plant which he had in mind, as shown by his figure and description was the following:

VIOLA DENTATA Pursh, Fl. Am. Sept. **1**: 172. 1812.

V. Porteriana Pollard, Bull. Torr. Club **24**: 404. 1897.

Misled by Le Conte's reference of Pursh's *dentata* to *emarginata*, I redescribed this imposing violet last year, after abundant specimens had been secured on an excursion of the Torrey Club to Bushkill, Pa. While its relationship is with *V. ovata*, I do not think the two plants can readily be mistaken for each other, and there is the further fact to be noted that *dentata* is a species of high altitudinal distribution, all the material that I have examined having been collected either in the mountains of eastern Pennsylvania or the Blue ridge in Virginia.

VIOLA OVATA Nutt., l. c. p. 148.

V. primulifolia Pursh, Fl. Am. Sept. **1**: 173. 1812; not *V. primulaefolia* L. 1753.

V. ciliata Muhl. Cat. 26. 1813, without synonymy or description.
V. sagittata var. β *ovata* T. & G. Fl. N. Am. **1** : 138. 1838.

In the typical form, as shown by contemporaneous collections in the herbarium of the Philadelphia Academy of Sciences, the leaves are oval rather than ovate, tapering somewhat at base as well as apex.

VIOLA OVATA HICKSII Pollard, Proc. Biol. Soc. Wash. **10**:92. 1896.

V. sagittata Hicksii Pollard, Bot. Gaz. **20** : 326. 1895.

Leaves distinctly deltoid-ovate, rather truncate at base. The prevailing form in the District of Columbia.

VIOLA CAROLINA Greene, Pitt. **3**:259. 1898.

I have not yet seen material of this species aside from the type sheet in Professor Greene's collection. It is apparently quite distinct from other members of the group in the south.

VIOLA ODORATA L. Sp. Pl. 934. 1753.

V. Thompsonæ Chapm. Fl. S. States 34. 1897. [ed. 3.]

A specimen of this violet was sent to the National Herbarium by Mrs. Thompson at the same time that it was placed in Dr. Chapman's hands, and was immediately recognized as *V. odorata*, a familiar escape in the north, but evidently not hitherto reported from the southern states.

VIOLA VITTATA Greene, Pitt. **3** :258. 1898.

This replaces *lanceolata* throughout the extreme southern states. The leaves are unlike those of any other violet in that they are so short-petioled as to appear almost sessile ; hence when they have attained full dimensions they bear a strong resemblance to the fronds of *Vittaria lineata* as the describer of the species has already observed.

VIOLA PRIMULÆFOLIA L. l. c.

A somewhat variable species. I have ventured to segregate as a variety the southern material as follows :

VIOLA PRIMULÆFOLIA **australis,** n. var.

Leaves much larger and thicker, decurrent on the reddish-tinged petiole; flowers larger than in the type ($1-1.5^{cm}$ broad, odorless. Throughout the southern states. Type in the National Herbarium, A. Fredholm, no. 431, Duval county, Florida.

VIOLA AMŒNA Le Conte, l. c. p. 144.

V. blanda var. *palustriformis* A. Gray, Bot. Gaz. 11. 255. 1886.

A much larger and more robust plant than *blanda*, usually more pubescent, with reddish petioles and odorless flowers. It is frequently stoloniferous, which is rarely the case in *blanda*, and prefers moist cliffs and shaded regions rather than the wet, grassy meadows in which *blanda* abounds.

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